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Agitated Delirium Contributes to Missed Testing and Delayed Diagnosis of Gastric Perforation

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NAME	COMPANY	RELATIONSHIP
Brooks T. Kuhn, MD	Grifols	Speaker
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	Boehringer Ingelheim	Consultant
	Astra Zeneca	Consultant
	Theravance	Author

Patrick Romano, MD, MPH; Debra Bakerjian, PhD, APRN, RN; Kathleen M. Carlsen, PA; Jonathan Trask, RN, for this Spotlight Case and Commentary have disclosed no relevant financial

relationships with ineligible companies related to this CME activity.

Learning Objectives

At the conclusion of this educational activity, participants should be able to:

- Identify indications and complications associated with nasogastric tube insertion.
- Describe the techniques of nasogastric tube placement.
- Describe how high-quality communication is essential, especially during shift changes and/or difficult procedures.
- Describe how to assess and treat acute agitation secondary to delirium.
- Understand how to identify unsuccessful nasogastric tube placement and how to avoid complications.

The Case

A 72-year-old man presented to the emergency department with dyspnea, nausea, and emesis. Computed tomography (CT) of the chest and abdomen revealed findings consistent with viral pneumonia and gastric distention without obstruction or mass. He was transferred to another hospital, diagnosed with COVID pneumonia and ileus, and admitted to a specialized COVID care unit. A nasogastric tube (NGT) was placed, supplemental oxygen was provided, and oral feedings were held.

Early in his hospital stay, the patient developed hyperactive delirium and pulled out his NGT. Haloperidol was ordered for use as needed (“prn”) and the nurse was asked to replace the NGT and confirm placement by X-ray. After the bedside nurse was unable to pass the NGT, the charge nurse attempted multiple times, but the NGT continued to coil in the patient’s mouth. After numerous attempts, the NGT was replaced, but X-ray was not performed due to miscommunication at the change of shift, which occurred right after NGT placement. Over the course of the following hours, the patient became increasingly disoriented and agitated requiring repeat doses of “prn” haloperidol. Eight hours after the NGT was replaced, the patient became hypotensive and hypoxemic. The overnight on-call physician was contacted, who called the rapid response team. Chest X-ray revealed air under the diaphragm suggesting enteric visceral perforation. Emergent CT of the chest and abdomen revealed a gastric perforation. The patient was transferred to the intensive care unit (ICU) and ultimately required endotracheal intubation with mechanical ventilation. In consultation with the patient’s family, it was determined that emergency surgery was not consistent with his goals of care. Despite resuscitative measures, the patient died.

The Commentary

By Jonathan Trask, RN, Kathleen M Carlsen, PA, Brooks T Kuhn, MD

Background

This case exemplifies the multiple problems that were often seen in hospitalized older adults during the height of the COVID-19 pandemic. The patient’s care was adversely affected by delays in diagnostic

evaluation, failure to recognize the cause of an acute confusional state, and an overwhelmed workforce in the setting of a pandemic with strict isolation precautions.

The patient in this case experienced cascading problems that ultimately led to clinical decompensation. Initially, the patient was admitted to the hospital with COVID pneumonia, hypoxemia, and abdominal distention. These issues, coupled with the patient's age and transfer to an unfamiliar location, placed him at high risk for developing delirium. Given the patient's diagnosis, isolation precautions were undoubtedly observed, limiting visitors to his care area. The patient became agitated and was treated with haloperidol, an antipsychotic medication with very limited evidence of efficacy for this off-label indication.[1] It is unknown if the staff evaluated the root cause of the patient's agitation, attributed it to delirium, or reported this acute change to any of the physicians involved in his care. The several hour delay in X-ray confirmation of NGT placement, apparently due to miscommunication at change-of-shift, led to more serious consequences from his iatrogenic injury. Strained staffing during a pandemic could have contributed to the delay in diagnosis. It is unknown if the root cause of the second instance of agitation was explored, but it was treated with additional haloperidol based on a "prn" order, without physician assessment. This commentary will discuss the various components of this case that contributed to the problems that the patient experienced, including the complications of nasogastric tube placement and the recognition and management of acute delirium.

Nasogastric Tube: Indications, Insertion Methods, Potential Complications

Indications for NGT placement include small bowel obstruction (SBO) or ileus, need for lavage of gastric contents, and administration of essential medications or enteral nutrition.[2] Larger NGTs ranging from 12 to 18 French (Fr), made up of stiffer material, are typically used for gastric decompression, SBO or ileus treatment, or gastric lavage.[3] Smaller 3.5 to 12 Fr NGTs can be placed in the stomach or small bowel and are made of softer material. They tend to be more comfortable and preferred for long-term feeding or medication administration.[3]

NGTs are typically placed at bedside via blind insertion through the nares or mouth; the tube is advanced through the esophagus with the distal tip of the tube dwelling within the stomach.[3,4] Desired tube insertion depth is often estimated before insertion by placing the proximal end of the tube at the tip of the patient's nose, looping the tube behind the patient's ear, and placing the distal tip at the xiphoid process (to approximate the location of the stomach).[3,4] Patients who are alert and able to participate in the NGT insertion can assist with the passage of the tube by swallowing during insertion.[3,4] These tubes may contain a guidewire or may have a weight at the tip to facilitate appropriate placement.[3,4] Current guidelines recommend radiographic examination by chest or abdominal X-ray as the "gold standard" for confirmation of appropriate tube placement in adults.[5-7] Alternate NGT insertion methods include fiberoptic camera-guided placement, fiberoptic NGT systems with self-contained, real-time insertion imaging, electromagnetic-guided NGTs, and ultrasound-guided NGT insertion.[6] Novel NGT insertion methods require the use of specialized equipment and training, which may be cost prohibitive, limiting availability.[8] Due to these limitations, blind NGT insertion remains the most common method of tube placement.[6] NGTs can be secured with either tape or nasal bridle systems secured around the nasal septum.[8-10] Bridled NGTs are associated with lower rates of dislodgement and have longer therapeutic dwell times than NGTs secured with only tape.[8-10] However, both systems can be uncomfortable for patients and can cause skin

abrasions, ulcers, and even bleeding.

Contraindications to blind NGT insertion include facial or skull base fractures; head, neck, or esophageal neoplasms; recent upper GI surgery; esophageal trauma or bleeding varices; and abnormal esophageal anatomy like strictures or diverticula.[4] Patients who are unable to cooperate with NGT insertion due to delirium are at increased risk of tube dislodgment, tend not to tolerate tube insertion, and may experience worsening confusion.[8] Complications associated with blind NGT insertion include intracranial tube placement, esophageal perforation, pulmonary complications (i.e. pneumothorax or tracheal tube placement), bleeding, and ulceration of the nares.[5,11-13] A study of medical device-related pressure injuries in the intensive care unit showed that 1.6% were caused by NGTs.[13] In a retrospective study, the blind placement of small-bore feeding tubes resulted in 3% of patients with the feeding tube advanced into the airway, 40% of which led to pneumothorax.[12]

NGTs should be routinely assessed every 2 to 4 hours for appropriate placement.[14,15] Assessments include marking and evaluating tube depth at the insertion site, evaluating the securement method, performing a brief respiratory and abdominal exam, and monitoring for signs of intolerance.[14,15] Signs of inappropriate NGT placement or placement intolerance include coiling in the throat or mouth, incessant coughing or respiratory compromise (which could indicate tracheal placement), bleeding, and abdominal pain or distention. These signs warrant further examination and possible NGT removal.[14,15] In general, NGT insertion and maintenance can be an unpleasant experience for patients, resulting in increased agitation and risk for dislodgement.[8,9,14,15] Bridling securement systems are not associated with higher levels of discomfort among patients.[8,9]

Delirium in the Acute Care Setting

Delirium is the most common psychiatric disorder in the hospital setting. The cumulative incidence of delirium ranges from 10% in the acute care setting up to 80% in the ICU setting.[16,17] It is estimated that 75% of cases of delirium are unrecognized.[16,17] Delirium is an acute confusional state typified by fluctuating inattention and confusion.[16,17] Delirium can manifest as three subtypes: hyperactive, hypoactive, and mixed.[16,17] Hyperactive delirium often presents with symptoms of acute confusion, agitation, hallucinations, or combative behavior.[16,17] Hypoactive delirium presents with symptoms of apathy, lethargy, stupor, somnolence, or decreased alertness.[16,17] Mixed delirium can present as a fluctuating course between the hyper and hypoactive subtypes.[16] Older and critically ill adults are at higher risk for developing delirium during hospitalization.[16,17]

Due to the high incidence of delirium among hospitalized patients, strategies for surveillance, prevention, and management should be implemented for older adults.[16,17] Delirium prevention and care bundles, like the ABCDEF Bundle, utilize a multifaceted approach for preventing and managing delirium.[18] This care bundle includes six components: *A*ssess, prevent, and manage pain; *B*oth spontaneous awakening trials (SAT) and spontaneous breathing trials (SBT); *C*hoice of analgesia and sedation; *D*elirium: assess, prevent, and manage; *E*arly mobility and exercise; and *F*amily engagement and empowerment. Specifically, the ABCDEF Bundle supports the routine use of a validated delirium screening tool, mindful prescription and administration of deliriogenic medications, appropriate management of pain, early mobilization, attention to sleep hygiene, and family engagement or the presence of family, loved ones, and

familiar objects.[18,19] Patients who use sensory aids such as eyeglasses and hearing aids should have access to them. Physical restraints have limited value as they may help to prevent removal of equipment or falls, but they are associated with increased risk for developing delirium or worsening agitation.[19]

Currently, there are no recommended pharmacologic treatments for prevention of delirium.[16,19] Historically, agitation, restlessness, and hyperactivity associated with delirium have been treated with sedatives like benzodiazepines; however, these medications mask the manifestations of delirium and may even worsen symptoms.[16,19] Atypical antipsychotics like haloperidol can be used to treat agitation associated with delirium, but the use of antipsychotics has had minimal effect on duration of delirium, length of ICU stay, length of hospitalization, and mortality risk according to recent systematic reviews.[19,20]

Isolation precautions for COVID-19 and other infectious respiratory pathogens require the use of personal protective equipment (PPE) like face masks, isolation gowns, face shields, and single occupancy rooms.[21] Isolation precautions are a necessity to prevent the transmission of infectious agents, but their use has been associated with an increased risk of social isolation of patients, feelings of anxiety and depression, medication errors and missed diagnoses, falls, inadvertent equipment removal, and delirium.[21] Donning PPE and entering through two sets of doors increases the time needed to reach the patient's bedside and decreases clinicians' ability to observe patients, which may cause safety issues.[20] Methods to mitigate these problems include increasing observation (either directly or through video), routinely reorienting patients, providing natural light and minimizing nocturnal awakenings, and encouraging mobility.[16-19]

Approaches to Improving Patient Safety

Beyond the direct complication of placing the NGT, the fundamental deficiency in this case was poor communication between the bedside and charge nurses, at nursing change of shift, and between the nurse and supervising health care provider. The delay in obtaining an X-ray after NGT placement could have been avoided if any of the team members had communicated a verbal order directly to a radiology technician, since portable X-rays are very frequently obtained in COVID care units. Several hours lapsed between replacement of the NGT and the confirmation X-ray – a time period during which the patient's condition steadily deteriorated.

When the patient experienced agitated delirium, its causes—including gastric perforation--were not explored before it was treated with antipsychotic medication. New onset agitation often represents a manifestation of metabolic derangements (e.g., hypoxia, acidosis, kidney or liver failure) or other clinical decompensation (e.g., sepsis, organ ischemia), so a wide range of potential causes should be considered and systematically investigated. The patient was also in a COVID-19 isolation unit, which could have increased his risk of complications and removing equipment (e.g., NGT, intravenous and bladder catheters) unbeknownst to the nursing staff, and delayed the arrival of health care providers at the bedside.

After multiple attempts in this case, the NGT was seemingly successfully replaced. Each attempt at NGT placement presents a risk of complications such as esophageal trauma, tracheal placement, or bleeding. Nursing staff could have halted any additional attempts at placement after the first few unsuccessful tries and informed the "on call" provider of the difficulty with tube placement. Use of a bridle securement device may have prevented the dislodgement of the first NGT. After events of this type, hospitals frequently implement practice changes requiring an "on call" physician to be contacted if multiple attempts at placing

NGTs or other percutaneous devices are unsuccessful, although the impact of such policies is unknown. Hospital policies may also limit “prn” prescribing of antipsychotics for agitation, requiring physician re-assessment before every dose or every other dose.

Daily reassessment of the need for invasive devices is important. Especially when an NGT is removed by the patient, heath care providers should reevaluate whether it is still necessary before attempting to replace it.[2,22] An NGT tube is not indicated for abdominal distension by itself, but a patient with intractable emesis who is at risk for aspiration may require decompression with an NGT.[2] If vomiting has improved and there is no evidence of SBO on imaging, an NGT is probably no longer needed.[2] Other reasons for discontinuation include resolution of symptoms or placement of a more permanent tube, such as a percutaneous endoscopic gastrostomy (PEG) tube or jejunostomy tube (“J-tube”) for ongoing nutritional needs.[2] Generally, a surgical enteral tube should be placed if the patient has had an NGT or small bowel tube for 4 weeks.[2] Use of a clinical decision tool for invasive devices may help clinicians to determine the timeliness of device removal.[22]

Conclusion

Several issues contributed to the decompensation and death of the patient in this case. The underlying cause was a serious complication of a relatively simple procedure that is commonly performed by bedside nurses in every US hospital. However, this procedure – blind insertion of an NGT – is not free of risk. The impact of the complication was compounded by lapses in communication between nursing staff and other care providers, multiple unsuccessful attempts at replacing the NGT, incomplete assessment of worsening agitation, prolonged periods when the patient was not observed despite his agitation and antipsychotic treatment, and delayed imaging after replacement of the NGT. Use of a standardized handoff tool to ensure completion of pending tasks, awareness of the conditions associated with new-onset agitation, and limitations on risky, blindly performed procedures could help to prevent complications of this type from occurring in the future.

Take-Home Points

- NGT placement is a common procedure in the hospital setting and is safe in most cases, but there can be serious complications such as esophageal perforations, intracranial perforations, placement into the airway, pneumothorax, nasal ulcerations, bleeding and worsening agitation.
- It is crucial to routinely reassess the necessity of invasive tubes, especially prior to reinsertion after dislodgement and in the setting of an agitated patient.
- High quality communication is essential to ensure timely confirmatory imaging, especially after difficult NGT placement.
- Health care providers must establish that the NGT is in the correct location before using it and continue to reassess the NGT frequently for possible dislodgement or complications.
- If a patient is agitated, health care providers must assess the potential contributing factors and treat appropriately by addressing those factors, using antipsychotic medications such as haloperidol only when necessary.

Jonathan Trask, RN, PhD
Clinical Resource Nurse
Medical Surgical Intensive Care Unit
UC Davis Health
jstrask@ucdavis.edu

Kathleen M Carlsen, PA-C
Assistant Clinical Professor PA and FNP Program
Betty Irene Moore School of Nursing
Medical Intensive Care Unit
UC Davis Health
Kmcarlsen@ucdavis.edu

Brooks Thomas Kuhn, MD, MAS
Assistant Professor of Clinical Medicine
Division of Pulmonary and Critical Care Medicine
UC Davis Health
btkuhn@ucdavis.edu

References

1. Nikooie R, Neufeld KJ, Oh ES, et al. Antipsychotics for treating delirium in hospitalized adults: a systematic review. *Ann Intern Med*. 2019 Oct 1;171(7):485-495. [Free full text]
2. ten Broek R, Krielen P, Di Saverio S, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2017 update of the evidence-based guidelines from the world society of emergency surgery ASBO working group. *World J Emerg Surg.* 2018;13(1):24-24. [Free full text]
3. Hodin R, Bordeianou L. Inpatient placement and management of nasogastric and nasoenteric tubes in adults. *UpToDate.* Updated July 26, 2022. Accessed October 18, 2022. [Available at]
4. Miller R, McClave A, Kiraly N, et al. A tutorial on enteral access in adult patients in the hospitalized setting. *JPEN J Parenter Enteral Nutr.* 2014;38(3):282-295. [Available at]
5. Metheny N, Krieger M, Healey F, et al. A review of guidelines to distinguish between gastric and pulmonary placement of nasogastric tubes. *Heart Lung*. 2019;48:226-235. [Free full text]
6. Fan E, Tan S, Ang S. Nasogastric tube placement confirmation: where we are and where we should be heading. *Proceedings of Singapore Healthcare*. 2017;26(3):189-195. [Free full text]
7. Killian M, Reeve N, Slivinski A, et al. Clinical practice guideline: gastric tube placement verification. *J Emerg Nurs.* 2018;45(3):P306.E1-306.E19. [Available at]
8. Chauhan D, Varma S, Dani M, et al. Nasogastric feeding in older patients: a review of current practice and challenges faced. *Curr Gerontol Geriatr Res.* 2021:1-7. [Free full text]
9. Lavoie J, Schindler C, Garnier-Villarreal M, et al. Nasogastric bridles are associated with improved tube-related outcomes in children. *JPEN J Parenter Enteral Nutr.* 2020;46(7):1568-1577. [Available at]

10. Seder W, Stockdale W, Hale L, et al. Nasal bridling decreases feeding tube dislodgment and may increase caloric intake in the surgical intensive care unit: A randomized, controlled trial. *Crit Care Med.* 2010;38(3):797-801. [Available at]
11. Isik A, Firat D, Peker K, et al. A case report of esophageal perforation: Complication of nasogastric tube placement. *Am J Case Rep*. 2014;15:168-171. [Free full text]
12. de Aguilar-Nascimento E, Kudsk A. Clinical costs of feeding tube placement. *JPEN J Parenter Enteral Nutr.* 2007;31(4):269-273. [Available at]
13. Schroeder J, Sitzer V. Nursing care guidelines for reducing hospital-acquired nasogastric tube-related pressure injuries. *Crit Care Nurse.* 2019;39(6):54-63. [Available at]
14. Judd M. Confirming nasogastric tube placement in adults. *Nursing*. 2020;50(4):43-46. [Available at]
15. Tripathi R, Hinic K. Best practice to verify ongoing placement of NG or OG tube after initial x-ray confirmation. *Worldviews Evid Based Nurs.* 2021;18(4):311-313. [Available at]
16. Maldonado J. Delirium in the acute care setting: characteristics, diagnosis, and treatment. *Crit Care Clin.* 2008;24:657-722. [Available at]
17. Zaal I, Slooter A. Delirium in critically ill patients: epidemiology, pathophysiology, diagnosis, and management. *Drugs.* 2012;72(11):1457-1471. [Available at]
18. Marra A, Ely E, Pandharipande P, et al. The ABCDEF bundle in critical care. *Crit Care Clin.* 2017;33:225-243. [Free full text]
19. Salluh J, Wang H, Schneider E, et al. Outcome of delirium in critically ill patients: systematic review and meta-analysis. *BMJ.* 2015;350:h2538. [Free full text]
20. Shen Y, Peng K, Zhang J, et al. Effects of haloperidol on delirium in adult patients: a systematic review and meta-analysis. *Med Princ Pract.* 2018;1-10. [Free full text]
21. Purssell E, Gould D, Chudleigh J. Impact of isolation on hospitalised patients for are infectious: systematic review with meta-analysis. *BMJ Open*. 2020; 10:e030371. [Free full text]
22. Ray-Barruel G. I-DECIDED®—A decision tool for assessment and management of invasive devices in the hospital setting. *Br J Nurs.* 2022;31(8):S37-S43. [Available at]

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